



EVOLUTION IN THE KITCHEN

How AI Is Transforming Food Product Development

Our Exploration Into the Role of Technology in Commercial Kitchens

Creating Better Together™





Culinary Progress Demands Innovation

Staying relevant and competitive in the modern food industry requires constant adaptation and evolution. Yet the willingness to adapt has always been met with some resistance.

Consider the introduction of the food processor. When food processors first entered the kitchen, some chefs viewed them as a shortcut—an impersonal machine that replaced the tactile precision of chopping, dicing, or blending by hand. To purists, using a food processor meant sacrificing technique for convenience. But over time, this tool proved its value, saving time on labor-intensive tasks without compromising quality. They remain as a testament to how innovation enhances—not replaces—culinary craft.

Artificial Intelligence (AI) and other technologies are just another phase of evolution in the kitchen, acting as powerful catalysts that can fuel necessary progress.

AI is fundamentally transforming how kitchens operate, from predicting consumer demands to assisting chefs in creating new flavor profiles.



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If kitchens don't adopt AI, they won't survive. A few years ago, it was normal to work on a product with a retailer for two to three years. If you took this long now, you'd be replaced by another product development partner.

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JOHN FEENEY
Culinary & Innovation
Director for Griffith
Foods Europe

Customers expect high-quality products faster than ever before because modern technology allows speed and quality to coexist. Food ingredient companies that don't advance risk losing opportunities to competitors who have taken the time to adopt innovative technologies.

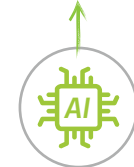
However, this requires more than simply adopting the latest AI technology into your processes. First, it's critical to leverage existing expertise, then augment it with AI-powered solutions designed to streamline your performance.



Knives are an essential tool that are still used in the kitchen everyday.



Food processors reduce the need for knives in some instances, but cannot fully replace knives.



AI enables faster, more accurate insights but still relies on quality chef and R&D inputs.



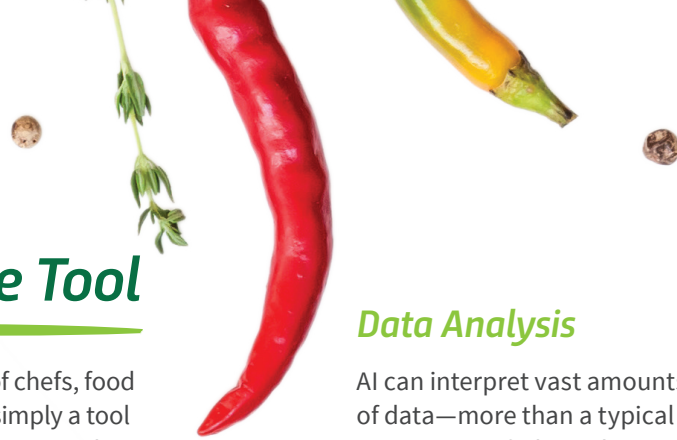
Research and expertise from chefs and R&D fuel innovation in the kitchen.



AI Is a Collaborative Tool

AI may seem like a threat to the creativity of chefs, food scientists, or product developers. But it is simply a tool that could be used to help you quickly get from a culinary idea to a viable product.

AI can streamline kitchen processes and add efficiency. To get the most out of these insights, AI must always be paired with the expertise and wisdom of a trained professional.



Data Analysis

AI can interpret vast amounts of data—more than a typical person can sift through. This allows it to extract actionable insights that can inspire how your kitchens adapt to ingredient availability, consumer demands, flavor trends, and virtually any change in the market.

Think of AI as your “data sommelier,” sifting through diverse information sources, like recipe catalogs, global taste patterns, consumer reviews, and sales figures.

This analysis can also reveal patterns in internal data that would otherwise be too obtuse for the average human to detect.

AI in Action at Griffith Foods

STEP 1

Chefs curate and observe trends

STEP 2

AI Palette analyzes billions of data points based on these trends

STEP 3

Trends are input into AI Palette

Data-validated trends

Griffith Foods enhanced its 2026 FlavorIQ® Food & Flavor Outlook program by merging the culinary expertise of its chefs with the advanced analytical capabilities of AI Palette’s artificial intelligence. The process started with Griffith Foods’ culinary professionals, who used their extensive market understanding and creative vision to identify the food and flavor trends poised to influence the near future.

After these chef-curated trends were selected, AI Palette delivered robust validation and evidence. The program allowed

Griffith Foods to process billions of data points from across the digital world—including consumer search engine activity, social media interactions, and online conversations about food. As a result, each trend featured in the FlavorIQ® program is supported by both expert insight and data-backed evidence of consumer interest.

This experiment of AI-augmented expertise ensured that our promoted trends were both creatively inspired and genuinely driven by consumer demand.



AI and Machine Learning for Ingredient Selection and Flavor Profiling

Good insights require good data.

It's important to note that the data you input into an AI software must be accurate and relevant for the program to give you a valuable starting point.

Idea Generation

AI's ability to process data provides chefs, food scientists, and product developers with efficient starting points. It serves as a valuable sounding board that helps guide chefs to specific ideas.

AI is most useful when it doesn't behave like a 'yes man'—someone who agrees with everything you say without

offering critical input. Instead, it should serve as a thoughtful partner, offering constructive feedback and using data to challenge and refine your ideas.

Expertise is augmented, not created.

AI can still "hallucinate" details, facts, and figures that may sound appealing but aren't grounded in truth. It may also give you the answer it thinks you want to hear, which can hinder innovation.

Professional expertise is always required. This expert knowledge allows chefs to assess whether AI suggestions are accurate, rooted in best practices, and are worth pursuing.



AI is emerging as a powerful tool in flavor development, changing how companies predict what consumers will like and streamlining the development of new, innovative flavor profiles.

Many leading companies

have used AI in some capacity for flavor development. For instance:

Nestlé has used AI to develop a sugar-reduced chocolate by restructuring sugar particles

for enhanced sweetness perception. Using only natural ingredients, Nestlé's Milkybar Wowsomes are advertised with 30 percent less sugar.

Impossible Foods and Beyond Meat have used AI to analyze the molecular composition of animal proteins to replicate them with their plant-based ingredients. Studies suggest AI can optimize the extrusion process, map unique combinations of plant proteins, and better tailor optimizations of plants for specific products.

AI is speeding up complex processes to deliver better, faster results.



Predicting Flavor Profiles from Molecular and Chemical Data

Understanding how flavor works at the molecular level is complex because food contains a wide variety of interacting compounds. Traditionally, researchers isolate or synthesize individual molecules to study their contribution to flavor.

Alternatively, flavor profiles can be explored by linking metabolomics data—information about all the small molecules in a sample—with sensory evaluations. Trained taste panels are also used to validate which compounds contribute to specific flavor notes.

A recent [study on FlavorMiner](#), a machine learning platform for extracting molecular flavor profiles, explores how AI can accelerate the identification of molecular flavor profiles.



How FlavorMiner Was Trained



Learning from Known Flavors

In the FlavorMiner study, AI was first trained on datasets of molecules with experimentally verified flavor profiles. FlavorMiner used over 13,000 molecules spanning more than 900 food products.



Utilizing Molecular Descriptors

Instead of computing 3D molecular structures, AI models use mathematical features—molecular descriptors—based on atomic composition, connectivity, and physicochemical properties.



Making Predictions with Trained Models

Once trained, machine learning algorithms identify patterns linking molecular descriptors to flavor profiles. This enables AI to predict the likelihood that new molecules will possess certain flavors.





Generating Novel Flavor Combinations and Recipe Formulation

In 2023, Coca-Cola broke headlines when they announced their Y3000 Zero Sugar flavor was **co-created with AI**. After combining AI insights with fans' perspectives about how they envision the future through emotions, aspirations, colors, and flavors, Coca-Cola created a unique taste for the limited edition drink.

While this is a dramatic use case, there are other, more grounded applications of AI in flavor development.

Finding Efficiencies in Existing Formulas

When working with a large database of formulations, even experienced R&D teams typically don't review every single option.

Instead, they select a few promising recipes to evaluate and experiment with. However, this approach can overlook potential improvements and efficiencies that may exist in the other unexamined formulations.

That's where senior expertise becomes essential—stepping in to analyze the broader dataset and determine which ingredients can best streamline the development of a new recipe. To support this process, developers can leverage AI models that automate this analysis, rapidly scanning hundreds or even thousands of formulations to identify optimal ingredients and even recommend the best suppliers for the job.



Determining Shelf Life

Nilesh Patel, Senior Director of Global Process Innovation at Griffith Foods, recently supported a project between Griffith Foods and a nationally recognized university aimed at using AI to predict the shelf life of sauces and dressings.

To achieve shelf stability, sauces typically require high levels of acid, salt, or sugar. However, these ingredients can significantly impact a product's flavor, so developers often push

the limit to see how little they can include.

With AI, developers can now input existing shelf-life data into a machine learning model. This allows them to simply enter a new formulation into the program and receive reliable shelf-life predictions based on the patterns learned from previous data—streamlining the process and reducing guesswork.

This process also allowed them to estimate the flavor profile of these sauces.

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We aim to simulate the ingredients in a way that exactly matches what a customer's brain is looking for—which cannot be written or clearly explained. We believe AI could help us get 80-90% of the way to that simulation.

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NILESH PATEL
Senior Director of Global Process Innovation for Griffith Foods Canada



AI-Powered Menu Development

During the COVID-19 pandemic, many restaurants pivoted to online menus for delivery and curbside pickup. This accelerated a digital transformation in how customers view and interact with menus.

From scanning a QR code for a menu to using the self-order kiosks that welcome patrons at several QSRs, it has become increasingly common to digitize menus for the customer's convenience.

Digitizing menu offerings allows restaurants to change prices and options more easily, collect data on popular dishes and repeat customers, and incorporate promotional messages to offer the right products at the right time.

Digital menus are also in line with what consumers want. Online ordering alone has skyrocketed in recent years—nearly **one-third of US consumers** order food online twice a week.

AI-powered trend analyses, pattern recognition, virtual taste testing—technology helps product developers fine-tune menus more than ever before.

But this just scratches the surface for menu creation and development innovations.



1/3 of US consumers order food online 2x a week.

Online ordering has skyrocketed in recent years, proving that digital menus are in line with what consumers want.

Streamlining Research and Development

AI significantly speeds up R&D and time to market by analyzing consumer data and predicting menu trends.

For example, AI can analyze vast amounts of consumer data to predict trending dishes, ingredients, and flavors and identify potential culinary innovations. The result is not only more efficient development cycles, but also menu items that are both creative and aligned with real consumer preferences.

Chef Berten Bos shared how AI chatbots can support this process:

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I created an 'Average Joe' AI agent to bounce ideas off of. It was useful because I could ask it questions and get direct feedback to eliminate ideas and increase my hit rate.

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BERTEN BOS
Senior Culinary Technologist for Griffith Foods Belgium

By creating generalized consumer personas based on data, Chef Berten Bos is able to simulate a consumer survey to immediately assess ideas. These personas become collaborative tools, helping teams explore ideas and get immediate, data-informed feedback.





Handling Complex Variables and Ingredients

Managing ingredients involves numerous complex variables, including availability, seasonality, and cost.

AI can help chefs navigate these complexities, analyzing these variables for each ingredient to help craft menus while limiting sourcing challenges. It can also deliver cost and data savings to menu plans based on how material costs fluctuate throughout the year. Some restaurants even use AI to automate seasonal menu adjustments based on inventory levels.

AI can deeply analyze the properties of specific ingredients.

Machine learning can also break down the scientific details of food—ingredients, enzymes, and temperatures—as a basis for a recipe. Take cheese, for example. [Climax Foods](#), a startup that specializes in plant-based foods, announced in 2024 that their new creamy vegan cheese was made with AI.

The company reverse-engineered what makes cheese taste so good—examining factors like the exact balance of various acids and how cheese responds to physical actions such as slicing or chewing. This data was then used to establish performance benchmarks, which their AI program aimed to achieve using different combinations of plant-based ingredients.



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Global flavors win when AI listens, not leads.



JOHN FEENEY
Culinary & Innovation
Director for Griffith
Foods Europe

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Facilitating Localization and Personalization

AI can assist restaurants and food brands with tailoring their menus for local markets. Chef John Feeney believes it can even help businesses tune into people’s palates faster by incorporating and respecting:



Cultural Food Norms



Nutritional Considerations



Regional Preferences



Sustainability Goals



Dietary Needs

AI can also deliver personalized experiences for individual customers. By harnessing analytics and predictive models, machine learning can deliver personalized menu recommendations tailored to individual preferences, dietary restrictions, and past dining history.

AI-generated menus can elevate dining experiences and ensure every visit to a restaurant feels like a memorable journey built just for the consumer.



Human Expertise Is Always King

Despite the vast capabilities of AI and the granular analysis it can provide, human expertise remains crucial and irreplaceable in various aspects of food product and menu development.

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If it is a perfect science, you don't need AI. But when answers aren't obvious, then AI can help you figure it out.



NILESH PATEL
Senior Director of Global Process Innovation for Griffith Foods Canada

Human

- Intuition
- Creative Application
- Sensory Judgment

Optimized Flavor Innovation *

- Data Crunching
- Analysis
- Predictions

AI



Humans Inject Creativity and Soul

AI sparks ideas, and the chefs give it soul. AI regurgitates, chefs interpret—that's when the magic happens.

Creativity enriches our engagement with food. There's an intangible, uniquely human quality to culinary development that AI alone can't replicate. And while the food industry can often be seen as art and science working together, AI helps with the scientific decoding. The artful component will continue to require human input, with chefs using their talents, along with AI insights, to create real, meaningful work.

Humans Offer Refined Interpretation and Judgement

AI provides data and suggestions, but humans are needed to understand and refine the output. Chefs, food scientists, and product developers need to rely on their own experience to digest and refine the information and ideas that AI provides.

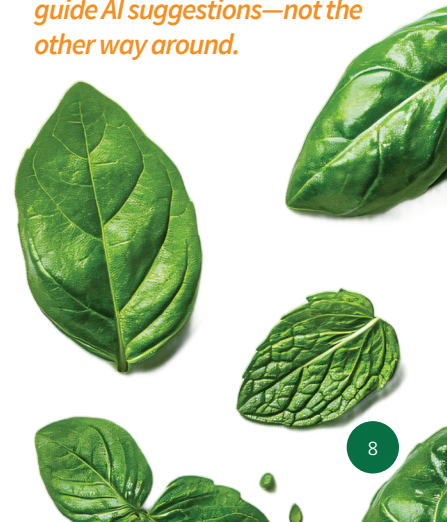
For example, while an AI program might provide examples of unique flavor combinations (like adding mustard to a pepper cream sauce or combining white chocolate with oysters), a chef will have the experience to know how to handle the nuances of these flavors.

Human expertise is an essential safeguard—you have to get on the bench, taste every formulation, and sign off on every product.

Humans Provide Quality Inputs

The effectiveness of AI is heavily dependent on the quality of the data and guidance it receives from human intelligence.

These programs work best when provided with as much high-quality information as possible. Chef insights should guide AI suggestions—not the other way around.





Shaping the Future of Food Together

At the intersection of tradition and transformation, Griffith Foods stands ready to help you thrive in a rapidly evolving food industry. As we've explored throughout this paper, AI is not a replacement for culinary vision—it is an accelerator of it. It allows product developers, chefs, and food scientists to amplify their

creativity, uncover insights faster, and innovate with more precision.

But to fully unlock this potential, you need a partner that not only understands the science and technology but also respects the soul of food.

Whether you're exploring how to streamline your R&D with predictive models or tapping into consumer trend analytics, Griffith Foods is here to guide you. Our global network of culinary experts, food scientists, and innovation leaders are already integrating these technologies into real-world applications—so you don't have to start from scratch.



Griffith Foods Supports Our Food Technology Efforts Through Six of Our Core Capabilities





Creating *Better Together*™

Contact us today to explore how we can transform your ideas
into market-ready success at [griffithfoods.com](https://www.griffithfoods.com)

